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(54) Abstract Title
Liquid-cooling system for a computer

(57) A liquid-cooling system for a computer, comprises a cooling tube 11 allowing cooling liquid flowing therein; a pump 12 connected between the cooling tube and driving the cooling liquid within the cooling tube to form a circulation loop; at least one heat sink 13 arranged on at least one chip to be cooled, and having a cooling conduit connected with the cooling tube; and at least one heat-dissipating plate 14 arranged on a computer case 30 or outside the case, and having a cooling conduit connected with the cooling tube. The heat generated within the computer is delivered to the computer case or outside the computer case by circulation of cooling liquid. The cooling effect is enhanced and the operation noise is reduced.

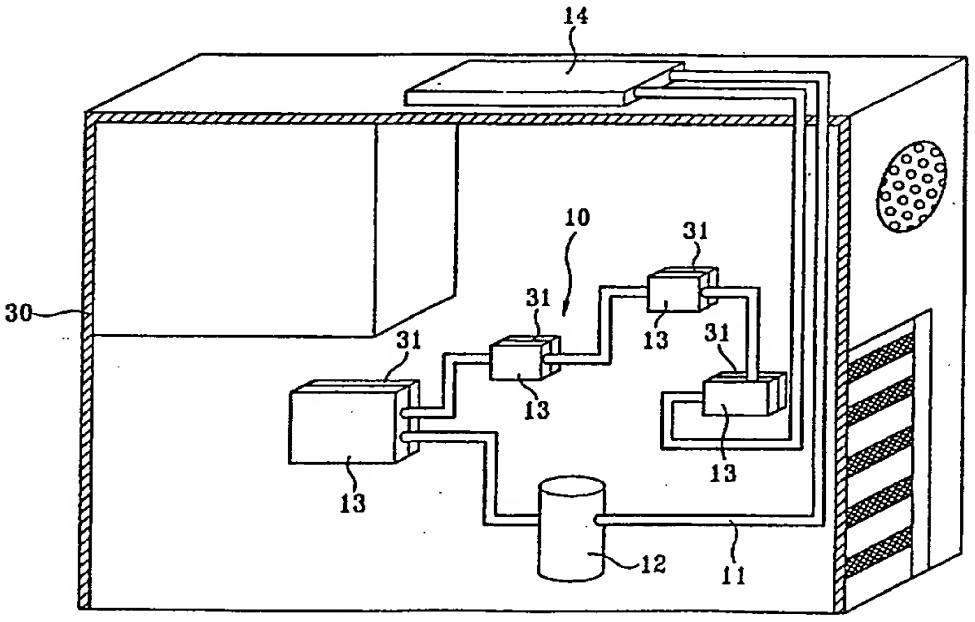

FIG.1

GB 2 349 985 A

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Application No: GB 9910948.0
Claims searched: 1-6

Examiner: Steven Davies
Date of search: 25 August 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

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Int Cl (Ed.6): H05K-7/20

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Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0454123 A2	(NEC) e.g. column 2, lines 34-55	1 at least
X	WO 98/08038 A1	(CHEON) the whole document	1-5

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Liquid-cooling device for computer

Field of the invention

The present invention relates to a liquid-cooling device for computer, which brings heat generated with the computer to the heat sink on the case or outside the case by liquid circulation.

Background of the invention

As the processing speed of the computer increases, the computer generates more heat by the internal circuits thereof. Therefore, the present computer generally has been provided with cooling fan on the CPU or other chips thereof to take away heat generated therein. However, the air-cooling effect provided by the cooling fan is practically not sufficient and running of the cooling fan has annoying noise.

It is the object of the invention to provides a liquid-cooling device for computer, wherein the heat sink is arranged on the computer case or outside the computer case, and the heat generated within the computer is delivered to the computer case or outside the computer case by circulation of cooling liquid. The cooling effect is enhanced and the operation noise is reduced.

The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawing, in which:

Brief description of drawing:

Fig. 1 is the schematic view showing the arrangement of the inventive liquid-cooling device.

Fig. 2 is the schematic view of the inventive liquid-cooling device.

Fig. 3 shows the planar view of a heat sink in the inventive liquid-cooling device.

Fig. 4 shows the planar view of another heat sink in the inventive liquid-cooling device.

Fig. 5 shows the cross sectional view of a heat sink in the inventive liquid-cooling device.

Fig. 6 shows the arrangement of the liquid-cooling device according to another embodiment of the present invention and arranged within a computer.

Fig. 7 shows the liquid-cooling device according to another embodiment of the present invention.

Fig. 8 shows the cross sectional view of a two-layer type heat sink in the inventive liquid-cooling device.

Detail description of preferred embodiment

With reference now to Figs. 1 and 2, the inventive liquid-cooling device 10 is arranged within a computer case 30 and comprises a cooling tube 11, a pump 12, at least one heat sink 13 and at least one heat-dissipating plate 14. The cooling tube 11 has a predetermined length and allows the cooling liquid flowing therein. The cooling tube 11 is designed to pass the components to be cooled.

The pump 12 is arranged at a predetermined position of the cooling tube 11 and functions to drive the cooling liquid within cooling tube 11 to form a circulation loop.

The heat sink 13 is of plate shape and made of material with excellent thermal conductivity such as Al, and the amount thereof depends on the chips to be cooled. In the preferred embodiment, there are four heat sinks 13 and those heat sinks 13 are attached to the chip 31 to be cooled such as CPU by thermal-conductive paste. As shown in Figs. 3 and 4, the size of the heat sink 13 is varied with the size of the chip 31 to be cooled. A cooling conduit 15 of straight shape, U-shape, or serpentine shape is arranged on the heat sink 13 and connected with the cooling tube 11 to bring the heat generated by the chip 31 to the heat sink 13 through the circulation of the cooling liquid within the cooling tube 11.

The heat-dissipating plate 14 is of plate shape and made of material with excellent thermal conductivity such as Al. The heat-dissipating plate 14 may have a plurality of fins (not shown) to increase the heat-exchange area. As shown in Figs. 6 and 7, the heat-dissipating plate 14 is attached to the case 30 or the slot 32 on rear side of the case 30 by thermal-conductive paste. Moreover, as shown in Figs. 6-8, the amount of the heat-dissipating plate 14 is varied with the size of the chip 31 to be cooled, and the heat-dissipating plate 14 can be multi-layer structure such as double layer or triple layer structure. As shown in Fig. 5, a cooling conduit 16 of straight shape, U-shape, or serpentine shape is arranged on the heat-dissipating plate 14 and connected with the cooling tube 11 to bring the heat generated within computer 31 to the heat-dissipating plate 14 through the circulation of the cooling liquid within the cooling tube 11. It should be noted the heat-dissipating plate 14 is preferably of serpentine shape if the heat-dissipating plate 14 has larger area.

To sum up, in the present invention, the heat-dissipating plate 14 is attached to the case 30 or the slot 32 on rear side of the case 30, and the heat generated by chip 31 is taken away to the case 30 or outside the case 30 by the circulation of the cooling liquid within the cooling tube 11.

Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have suggested in the foregoing description, and other will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended claims.

I claim

1. A liquid-cooling device for computer, comprising

a cooling tube allowing cooling liquid flowing therein;

a pump connected between said cooling tube and driving said cooling liquid within said cooling tube to form a circulation loop;

at least one heat sink arranged on at least one chip to be cooled, and having a cooling conduit connected with said cooling tube; and

at least one heat-dissipating plate arranged on a computer case or outside the case, and having a cooling conduit connected with said cooling tube.

2. The liquid-cooling device for computer as in claim 1, wherein said heat sinks is attached to the chip to be cooled by thermal-conductive paste.

3. The liquid-cooling device for computer as in claim 1, wherein said heat-dissipating plate is multi-layer structure.

4. The liquid-cooling device for computer as in claim 1, wherein said cooling conduit on said heat sink is of straight shape, U-shape, or serpentine shape.

5. The liquid-cooling device for computer as in claim 1, wherein said cooling conduit on said heat-dissipating plate is of serpentine shape.

6. A liquid-cooling device for a computer, as described herein with reference to and as illustrated in the accompanying drawings.

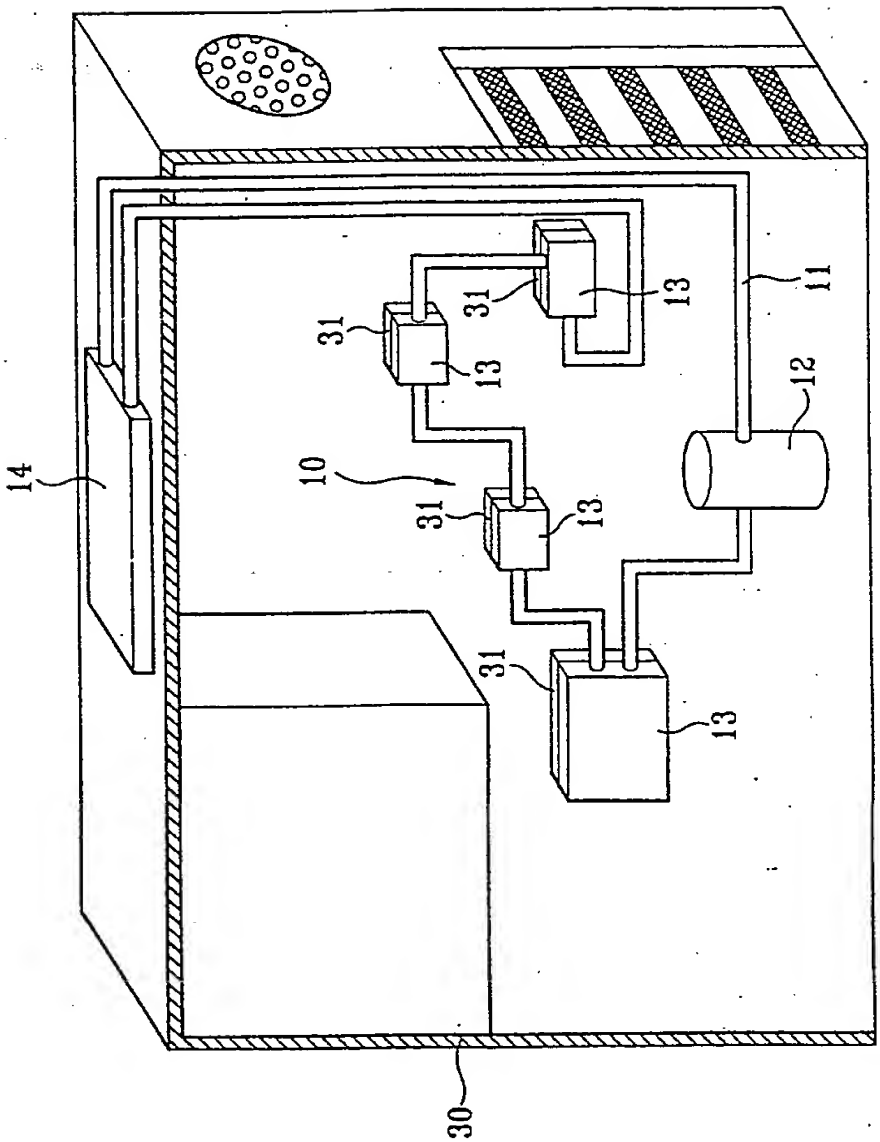

FIG.1

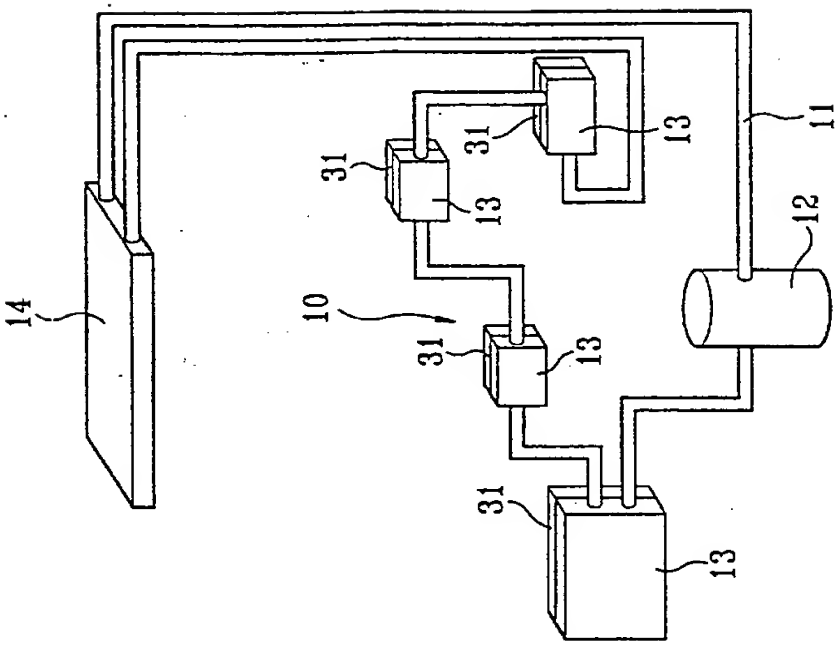

FIG.2

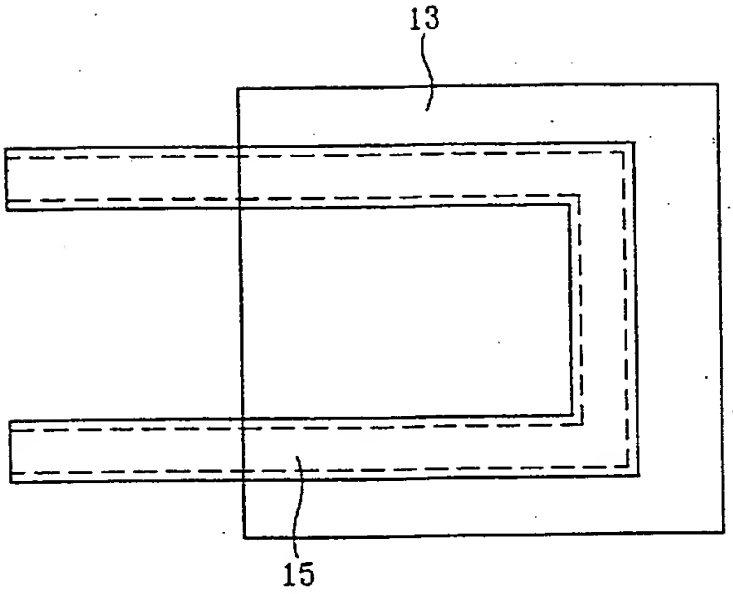

FIG.3

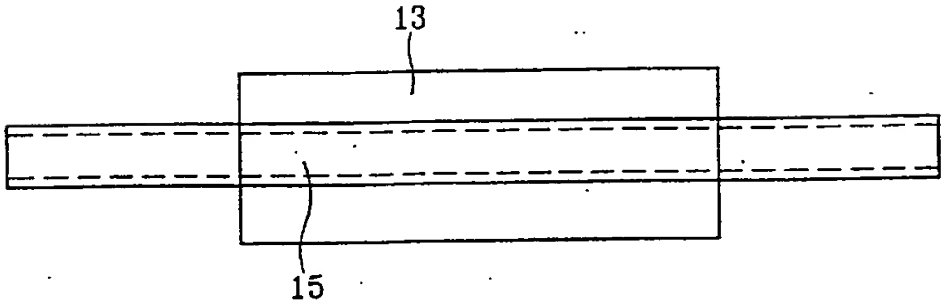

FIG.4

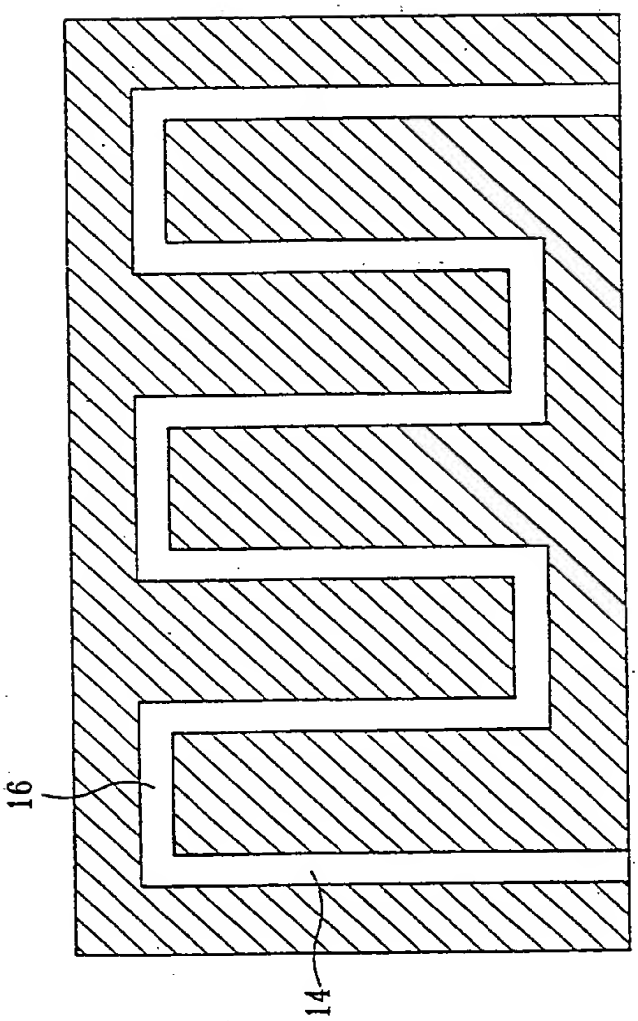

FIG.5

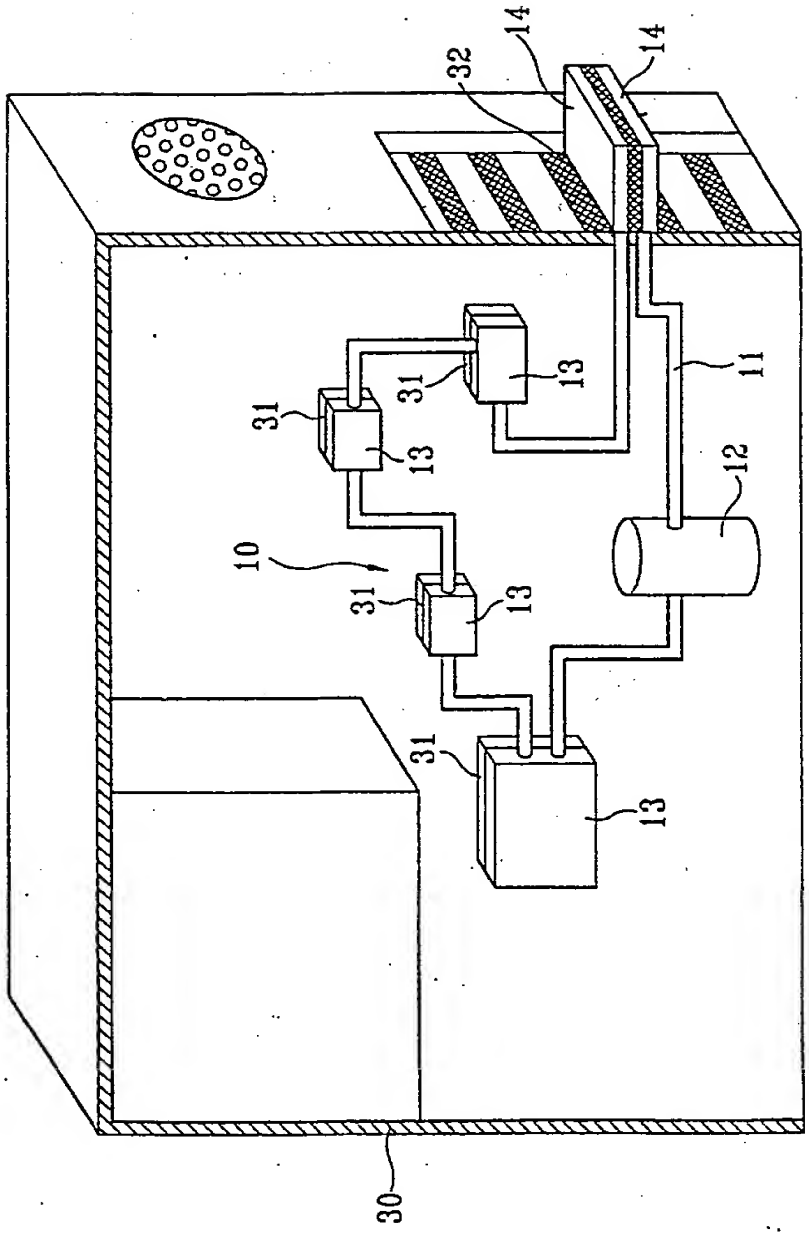

FIG.6

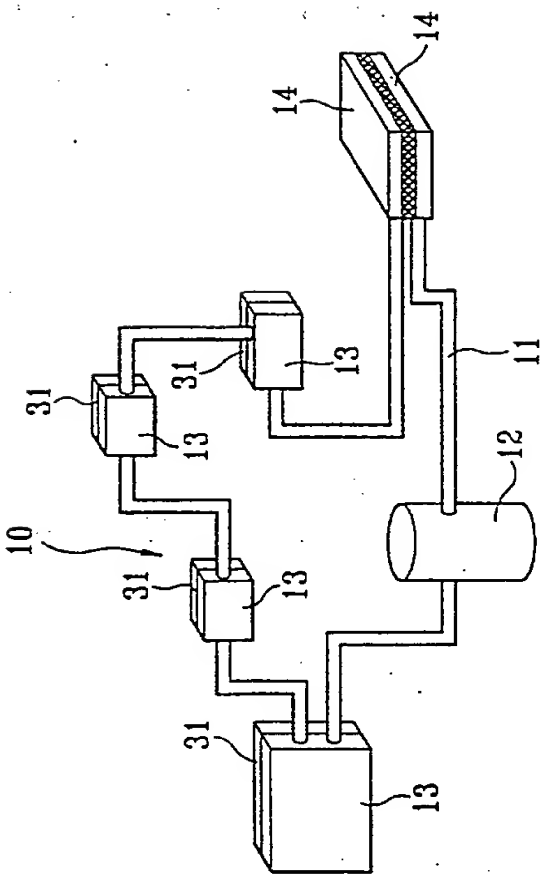

FIG.7

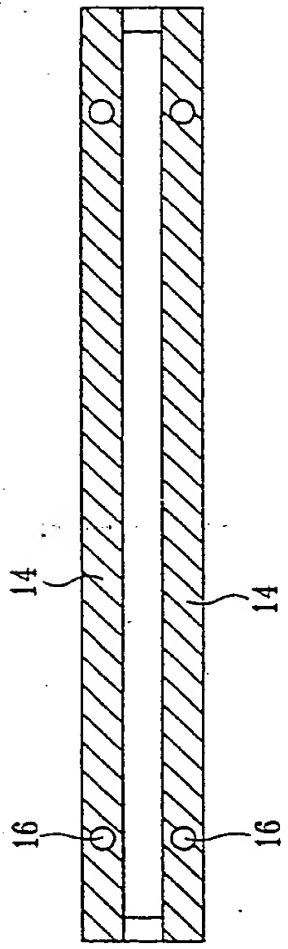

FIG.8